

App. Serial No. 10/538,217
Docket No.: NL021418 US

Remarks

Claims 1-16 are currently pending in the patent application. For the reasons and arguments set forth below, Applicant respectfully submits that the claimed invention is allowable over the cited references.

The instant Office Action dated July 17, 2007 indicated the following rejections: claims 9 and 10 stand rejected under 35 U.S.C. § 102(b) over Murphy (U.S. Patent No. 6,444,528); claims 1-2, 4-6 and 8 stand rejected under 35 U.S.C. § 103(a) over Murphy in view of Lynch *et al.* (U.S. Patent No. 4,643,804). The Office Action also notes that claims 3 and 7 are objected to as being dependent upon a rejected base claim, and that claims 11-16 are allowed. Applicant appreciates the allowance of claims 11-16.

Applicant respectfully traverses the Section 102(b) rejection of claims 9-10 because the cited portions of the Murphy reference fail to correspond to claim limitations directed to a thick oxide plug formed of oxidized porous silicon. The Examiner continues to assert that this is a product by process limitation even though no such language is present. Claim 9 clearly recites a thick oxide plug formed of oxidized porous silicon, not a thick oxide plug formed by oxidizing porous silicon. The claim specifies what the plug is made of (*i.e.*, oxidized porous silicon), not the process by which the plug is made. Thus, the claimed plug is made of silicon that is both oxidized and porous. While such recitation is structural, Applicant is permitted to use (and the Examiner cannot ignore) language that recites a process because the case law and the M.P.E.P. require that such a limitation be addressed:

The structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art, especially where the product can only be defined by the process steps by which the product is made, or where the manufacturing process steps would be expected to impart distinctive structural characteristics to the final product. -- M.P.E.P. § 2113; *See, also, In re Garnero*, 412 F.2d 276, 279, 162 USPQ 221, 223 (CCPA 1979)

Applicant notes that process of oxidising a plug would still carry patentable weight as it would impart distinctive structural characteristics on the final product (*i.e.*, oxidation). The rejection is therefore improper because the cited portions of the Murphy reference do

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not teach that the bottom layer 27 of the gate dielectric layer contains silicon that is both oxidized and porous, as is the oxide plug of the claimed invention.

Moreover, the Examiner appears to be improperly reading limitations from Applicant's specification in to claim 9. *See, e.g.*, page 7:7-9 of the instant Office Action. "Though understanding the claim language may be aided by explanations contained in the written description, it is important not to import into a claim limitations that are not part of the claim. For example, a particular embodiment appearing in the written description may not be read into a claim when the claim language is broader than the embodiment." *See Superguide Corp. v. DirectTV Enterprises, Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004) and M.P.E.P. § 2111.01. As such, the discussion in Applicant's specification of a plug being formed by oxidizing porous silicon does not preclude Applicant from claiming a plug that is made of silicon that is both oxidized and porous. Nor does such discussion enable the Examiner to read such limitations in to the claim. Accordingly, the Section 102(b) rejection of claims 9-10 is improper and Applicant requests that it be withdrawn.

Applicant respectfully traverses the Section 103(a) rejection of claims 1-2, 4-6 and 8 because the Examiner has provided no evidence of motivation to combine the Murphy and Lynch references. This approach is contrary to the requirements of Section 103 and relevant law. "A patent composed of several elements is not proved obvious merely by demonstrating that each element was, independently, known in the prior art." *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (U.S. 2007). The Examiner asserts that one of skill in the art would combine the cited teachings of Murphy and Lynch in order to "minimize the stress level in the plug region and improve the electrical characteristics of trenches that include bottoms having surface roughness and/or sharp or irregular corners" as taught by Lynch. *See, e.g.*, the Abstract and Col. 4:45-46. However, the Examiner fails to establish that the Murphy reference is susceptible to these problems. Moreover, the Examiner has not presented any evidence that modifying Murphy with the cited teaching of Lynch would in any way minimize the stress level in the plug region of the Murphy reference, which is different from the plug region of the Lynch reference.

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More specifically, the cited portions of the Lynch reference teach that surface roughness 20 and/or sharp or irregular corners (22 and 24) are a problem when a thin dielectric layer 18 (e.g., 200 Angstroms) is grown or deposited on the bottom of the trench 10. *See, e.g.*, Figure 1 and Col. 2:40-68. However, the cited portions of Murphy teach that the selective oxide layer 46 that is deposited on the bottom 44 of trench 34 has a thickness of 4000-5000 Å. *See, e.g.*, Figure 6 and Col. 5:1-20. Thus, Applicant submits that the problems identified by Lynch would not lead one of skill in the art to modify the Murphy reference as asserted by the Examiner. Moreover, the cited portions of Murphy teach that damage from the silicon etch process used to form teach 34 is removed by any one of conventional techniques, such as soft etch and annealing. *See, e.g.*, Col. 4:13-34. As is shown in Figure 2, the bottom 17 of Murphy's trench 10 does not have "surface roughness and/or sharp or irregular corners." Thus, one of skill in the art would not be motivated to modify Murphy to address problems that do not exist.

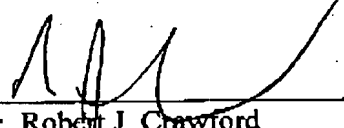
Moreover, the cited portions of the Murphy reference appear to teach away from using the process taught by Lynch. According to M.P.E.P. § 2141.02, a "prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention." The cited portions of the Lynch reference teach that the final thickness of the trench-bottom oxide region 34 is approximately 1500 Å. *See, e.g.*, Col. 4:54-57. However, the Murphy reference teaches that the selective oxide layer 46 is deposited to a thickness of 4000-5000 Å with a final thickness of around 4000 Å (*see, e.g.*, Col. 5:1-44), and that select oxide 56 has a final depth of approximately 3500 Å (*see, e.g.*, Col. 7:4-9). The process taught by Lynch produces an oxide region that is significantly thinner than the select oxide of the Murphy reference. As a stated purpose of Murphy is to have a thick dielectric layer on the bottom of the trench (*see, e.g.*, the abstract), one of skill in the art would not be motivated to modify Murphy because such a modification would result in Murphy having a significantly thinner dielectric layer. In view of the above, the Section 103(a) rejection of claims 1-2, 4-6 and 8 is improper and Applicant requests that it be withdrawn.

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In view of the remarks above, Applicant believes that the rejections have been overcome and that the application is in condition for allowance. Should there be any remaining issues that could be readily addressed over the telephone, the Examiner is asked to contact the agent overseeing the application file, Peter Zawilski, of NXP Corporation at (408) 474-9063.

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